REMARKS

I. Introduction

Claims 1 to 5 and 9 to 10 are pending in the present application. In view of the foregoing amendments and the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

II. Rejection of Claims 1 to 5 Under 35 U.S.C. § 112

Claims 1 to 5 stand rejected under 35 U.S.C. § 112, second paragraph as allegedly indefinite. In reference to claim 1, the Office Action asserts that it is unclear whether the phrase "for an ozone generator electrode" requires the tube to be an ozone generator electrode or not. The Office Action further asserts that claim 9 fails to further limit claim 1. Claim 1 has been amended herein without prejudice to clarify that the method is for producing an ozone generator electrode, the ozone generator electrode including the gilded quartz or aluminum-oxide-containing tube. Support for the amendments to claim 1 may be found, for example, on page 2, lines 5 to 10 of the Specification. In view of the foregoing, it is respectfully submitted that claims 1 to 5 fully comply with the requirements of 35 U.S.C. § 112, and withdrawal of this rejection is therefore respectfully requested.

III. Rejection of Claim Under 35 U.S.C. § 103 (a)

Claim 1 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 3,653,946 ("Fefferman"), U.S. Patent No. 2,984,575 ("Fitch"), U.S. Patent No. 3,607,379 ("Leinkram et al. ") and U.S. Patent No. 5,795,841 ("Kuerschner et al."). Applicants respectfully submit that the combination of Fefferman, Fitch, Leinkram et al and Kuerschner et al. does not render obvious claim 1 for the following reasons.

Claim 1 relates to a method of producing an ozone generator electrode, which ozone generator electrode includes a gilded quartz or aluminum-oxide-containing tube. Claim 1 recites that the method includes preparing coating material which contains gold, cleansing a quartz or aluminum-oxide-containing tube, drying the quartz or aluminum-oxide-containing tube in a first drying step after the cleansing step, smearing the prepared coating material on the quartz or aluminum-oxide-containing tube to form a film thereon after the first drying step, drying the

quartz or aluminum-oxide-containing tube in a second drying step after the smearing step, inspecting the dried quartz or aluminum-oxide-containing tube after the second drying step, putting the dried quartz or aluminum-oxide-containing tube into a stove after the second drying step, which is maintained at the temperature between 780 to 880°C, to bake for 10 to 14 hours, and retrieving the tube after the temperature in the stove is below 110°C, and putting the tube under room temperature.

Fefferman purports to relate to a method of depositing an adherent gold film on the surfaces of a suitable substrate, Fitch purports to relate to gold tertiary mercaptides and method for the preparation thereof, and Kuerschner et al. purport to relate to a process for producing coated, nonporous support materials. The Office Action contends that Fefferman describes "preparing a coating material which contains gold[,] cleansing the substrate . . ., which may be alumina[,] brushing . . . the prepared coating material on the substrate to form a film thereon[,] drying the substrate[,] baking the substrate at a temperature of 427-1054°C to form a gold film[,] and cooling the substrate to room temperature." Office Action at p. 3. The Office Action admits, inter alia, that Fefferman does not disclose baking at 780 to 880°C for 10 to 14 hours. Office Action at p. 4. The Office Action states that Fefferman discloses a temperature range that overlaps the claimed temperature range but admits that the baking time described by Fefferman is shorter that the claimed baking time. The Office Action contends that Kuerschner et al. describe that "adhesion of metals, such as gold . . ., to ceramic substrates, such as alumina or quartz . . . may be improved by heating at 200-1000°C for 0.5 to 24 hours." Office Action at p. 4. The Office Action contends that "[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected a temperature and time form [sic] within the claimed ranges because [Kuerschner et al.] disclose[] that they are operative for increasing the adhesion of metals to ceramics." Office Action at p. 4.

Applicants respectfully submit that the description by Kuerschner et al. of a broad range of 200 to 1000°C for the broad time range of 0.5 to 24 hours, when combined with Fefferman and Fitch as proposed in the Office Action, does not render obvious claim 1 for at least the reason that due to severe requirements of electrodes used in an ozone generator, e.g., high temperature, high electric current, high voltage, etc., the particular ranges of baking temperature and baking time are crucial to the usefulness of the tube as an electrode for an ozone generator. See

MPEP § 716.01(a). In this regard, the Examiner's attention is directed to, for example, page 3, lines 19 to 23 of the Specification, which state that "[t]he coating made by [the method of the present invention] adheres well on the surface such that it will not easily scale off under the impact of electrons at high frequency and high voltage" and that "high frequency is defined at the range of 15KHz to 40KHz; and the high voltage is defined at a peak-to-peak value from 10KV to 18KV." The Examiner's attention is further directed to the Second Affidavit of Kuang-Lang Huang submitted herewith which states that if an Au coating is to be used in the electrodes of an ozone generator, in which the electrodes must withstand high temperature, high electric current, and high voltage, it is crucial that the baking temperature be maintained in the range between 780°C and 880°C.

The temperature range of 427 to 1054°C, described by Fefferman, and the temperature range of 200 to 1000°C, described by Kuerschner et al., are too broad to satisfy the requirements of a gold film applied to a quartz tube or aluminum-oxide-containing tube according to the method hereof. Neither Fefferman nor Kuerschner et al. describes, or even suggests, any baking temperatures or times within their respective ranges and neither reference discloses, or even suggests, coating temperatures for a tube for an ozone generating electrode as claimed.

As further regards the "retrieving the tube after the temperature in the stove is below 110°C," the Office Action again contends that Fefferman describes "that the cooling of the substrate should be controlled in order to reduce stress" and that "[t]he Examples indicate that this may be done by leaving the substrate in the furnace . . . until a certain temperature is reached." Office Action at pp. 4 to 5. However, Fefferman state at col. 4, lines 46 to 48 that "[t]he substrate was allowed to cool slowly through normal radiation . . . to ***400°F*** [approximately ***204°C***] whereupon it was removed from the furnace" (emphasis added). See also, col. 5, lines 4 to 6. Accordingly, Fefferman does not disclose, or even suggest, "retrieving the tube after the temperature in the stove is below 110°C" as recited in claim 1. As to the unsupported contention that the description of Fefferman "at col. 5, lines 10-12 makes it appear that the substrate may also be left in the oven until it reaches room temperature," the Office Action continues to merely rely on nothing more than pure speculation and conjecture as to the statement of Fefferman located at col. 5, lines 10 to 12, to wit, "[a]fter reaching 1,200°F, the substrate is allowed to cool slowly through normal radiation to room temperature (3 hours)." It is respectfully

submitted that the statement that "[a]fter reaching 1,200°F, the substrate is allowed to cool slowly through normal radiation to room temperature (3 hours)" does not provide a disclosure, or even a suggestion, of "retrieving the tube after the temperature in the stove is below 110°C, and putting the tube under room temperature" as recited in claim 1.

Fefferman states at col. 5, lines 4 to 12:

> The substrate was allowed to slowly cool through normal radiation (2 hours) to 400° F. whereupon it was removed from the furnace. Additional gold was electroplated on the gold coated substrate employing a conventional gold citrate plating bath whereafter the substrate was refired to 1,200° F. to improve adhesion of the resultant plated gold film to the substrate. After reaching 1,200° F., the substrate is allowed to cool slowly through normal radiation to room temperature (3 hours).

Firstly, in the example provided by Fefferman the substrate is stated to be first coated with gold and then the gold coated substrate is stated to be dipped in a gold citrate plating bath solution, refired to 1200°F and then cooled to room temperature. See col. 4, line 49 to col. 5, line 12. Therefore, a gold coated substrate, not a dried quartz or aluminum-oxide containing tube, as recited in claim 1, is heated and then retrieved after the temperature of the stove is below 110°F. As indicated above, the substrate of Fefferman is originally coated and then heated, however, according to the example this heated substrate is cooled to 400°F, not below 110°F, as recited in claim 1. See col. 5, lines 4 to 6. The substrate, already coated with gold, is then dipped in a gold citrate bath solution. The above reference (col. 5, lines 4 to 12) refers to cooling of this coated and then dipped substrate. However, claim 1 recites heating of a dried quartz or aluminum-oxide containing tube and then retrieval of this tube not heating of an already gold coated substrate and retrieval of said reheated gold coated substrate.

Further, contrary to the assertions contained in the Office Action, nothing in the foregoing excerpt "indicates that the substrate is not disturbed during cooling." Office Action at p. 7. Applicants respectfully request that the Examiner point out specifically what language is being relied upon to in an effort to support the otherwise unsupported assertion that the above excerpt states that the substrate is not removed from the oven during cooling, i.e., not disturbed during cooling. As

indicated above, at least at col. 5, lines 4 to 6 Fefferman specifically calls for the removal of the substrate from the oven during cooling.

Further, contrary to the assertions in the Office Action nothing in the foregoing excerpt "suggests retrieving the tube from the furnace only after room temperature is reached." Office Action at p. 7. The above excerpt specifically calls for cooling the substrate for 3 hours to room temperature. See col. 5, line 12. The excerpt does not indicate what temperature is maintained in the oven after the substrate reaches 1,200° F. nor how long it would take the oven to cool to room temperature. As one skilled in the art would recognize removing the substrate from the hot oven once it reaches 1,200° F. is more likely to reduce the temperature of the substrate to room temperature in three hours than leaving the substrate in the hot oven. Further, one skilled in the art would recognize that at least from the perspective of maximizing production efficiency of coated substrates one would remove that substrate from the oven as soon as it reaches 1,200° F. In this regard, Fefferman states that "[a]fter the substrate has been heat-treated to form a continuous adherent gold-film, the substrate is ***cooled*** to room temperature at such a rate as to reduce the amount of stress formed in the substrate and the glassy or crystalline matrix." See col. 3, lines 69 to 73 (emphasis added). Respectfully, Applicants submit that ***cooling*** step would involve removing the substrate from the oven upon reaching 1,200° F. as opposed to reducing the heat produced by the oven. Thus, the conclusions and assertions contained in the Office Action are nothing more than pure conjecture or speculation, which cannot sustain an obviousness rejection.

Because the thermal expansion coefficient of gold is greater than that of quartz, the coating of the tube that is retrieved at a higher temperature would easily scale off from the surface of the tube due to instantaneous thermal contraction to thereby reduce the lifespan of the tube. Applicants have discovered that, in general, tubes that are retrieved at a high temperature possess inferior coating adherence. Other than the inferior coating adherence, other features (e.g., conductivity, thickness and color of gold coating) of the tubes may not vary much from those tubes that are retrieved after natural cooling to lower than 110°C. Hence, the effects of retrieving the tubes at a high temperature might not be apparent at the initial operation of the ozone generator. The reduction in the

performance of the ozone generator is particularly proportional to the temperature under which the tubes are retrieved from the stove.

On the other hand, Applicants have further discovered that there is no observation of significant reduction in the performance of the ozone generator applying tubes that are retrieved after natural cooling to lower than 110°C.

The 780 to 880°C baking temperature range recited in claim 1, when used in the method as presently claimed, unexpectedly results in a coated tube with superior properties for an ozone generator electrode. The Second Affidavit of Kuang-Lang Huang sets forth, inter alia, that above 880°C, the gold coating may evaporate resulting in a thinner coating; that below 780°C, a gold coating may not adhere well to the surface of a tube made of quartz or Al_2O_3; and that for electrodes of an ozone generator, a baking temperature maintained in the range between 780°C and 880°C is crucial. The affidavit further refers to a color photograph of: (i) samples of gold coated tubes used for ozone generator electrodes that were produced according to the claimed method; and (ii) samples of gold coated tubes in which the baking temperatures were outside of the claimed 780 to 880°C baking temperature range.

As seen in the photograph, and as averred to in the second affidavit, at a baking temperature of 800°C (i.e., between 780 and 880°C as recited in claim 1), the tube has the "goldest" color and the least amount of the blackish-colored un-oxidized solvent as compared to tube baked at other higher and lower temperatures. The blackish-colored coating on the tubes baked at temperatures below 800°C is indicative of an inferior ozone generating electrode with a higher electrical resistance and thus, is more susceptible to damage from higher operating temperatures. For baking temperatures above 900°C, the gold coating evaporates during baking resulting in a thinner coating as indicated by the lighter colors of the tubes.

Applicants respectfully submit that the Second Affidavit of Kuang-Lang Huang, including the photographic evidence, clearly establish that the specific baking temperature range of claim 1 produces unexpected results for a coating of a tube for an ozone generating electrode.

Although the references cited in the Office Action may disclose broader ranges of baking temperature and time in forming the gold coating, the quality would not emulate that of the coating formed by the method as claimed.

The Office Action states at pages 7 to 8 that "[t]here is no showing of the conditions which lead to the inferior results." Respectfully, the photograph referred to in the Second Affidavit of Kuang-Lang Huang plainly shows that baking at or below 700°C or at or above 800°C results in inferior coating.

As set forth above, the method claimed includes the following limitations:

(1) maintaining the baking temperature between 780 and 880°C;

(2) baking the coating for 10 to 14 hours;

(3) retrieving the tube after the temperature in the stove being below 110°C; ***and***

(4) putting the tube under room temperature.

Only with all the four characteristics being possessed will the quality of the coating be obtained. However, none of the cited references, either singularly or in combination, fully discloses, or even suggests, all the characteristics recited in claim 1. Furthermore, none of the cited references, either singularly or in combination, discloses, or even suggests, operating conditions similar to those set forth in claim 1.

In rejecting a claim under 35 U.S.C. § 103 (a), the Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). As indicated above, none of the references relied upon disclose, or even suggest, the parameters of putting the dried quartz or aluminum-oxide-containing tube in a stove, which is maintained at the temperature between 780 to 880°C, to bake for 10 to 14 hours or of retrieving the tube after the temperature in the stove is below 110°C, and putting the tube under room temperature as recited in claim 1. It is therefore respectfully submitted that the

combination of Fefferman, Fitch and Kuerschner et al. does not render obvious claim 1. The criticality of the baking temperature parameters and the unexpected results achieved by the critical baking temperature parameters recited in claim 1 are further evidence of the non-obviousness of claim 1.

Moreover, it is respectfully submitted that the cases of In re Fine, supra, and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), make plain that the Office Action's generalized assertions that it would have been obvious to modify or combine the references do not properly support a § 103 rejection. It is respectfully submitted that those cases make plain that the Office Action reflects a subjective "obvious to try" standard, and therefore does not reflect the proper evidence to support an obviousness rejection based on the references relied upon. In particular, the Court in the case of In re Fine stated that:

> The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. This it has not done. . . .
>
> **Instead, the Examiner relies on hindsight in reaching his obviousness determination. . . . One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.**

In re Fine, 5 U.S.P.Q.2d at 1598 to 1600 (citations omitted; italics in original; emphasis added). Likewise, the Court in the case of In re Jones stated that:

> Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . .
>
> **Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the modifications . . . necessary to arrive at the claimed [invention].**

In re Jones, 21 U.S.P.Q.2d at 1943, 1944 (citations omitted; italics in original).

That is exactly the case here since it is believed and respectfully submitted that the present Office Action offers no evidence whatsoever, but only conclusory hindsight, reconstruction and speculation, which these cases have indicated does not constitute evidence that will support a proper obviousness finding. Unsupported assertions are not evidence as to why a person having ordinary skill in the art would be motivated to modify or combine references to provide the claimed subject matter of the claims to address the problems met thereby. Accordingly, the Office must provide proper evidence of a motivation for modifying or combining the references to provide the claimed subject matter.

More recently, the Federal Circuit in the case of In re Kotzab has made plain that even if a claim concerns a "technologically simple concept" -- which is not the case here -- there still must be some finding as to the "specific understanding or principle within the knowledge of a skilled artisan" that would motivate a person having no knowledge of the claimed subject matter to "make the combination in the manner claimed," stating that:

> In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the manner claimed. In light of our holding of the absence of a motivation to combine the teachings in Evans, we conclude that the Board did not make out a proper prima facie case of obviousness in rejecting [the] claims . . . under 35 U.S.C. Section 103(a) over Evans.

In re Kotzab, 55 U.S.P.Q.2d 1313, 1318 (Fed. Cir. 2000) (emphasis added). Again, it is believed that there have been no such findings.

Of course, objective evidence, including evidence of unexpected results, are relevant and must be considered in every case in which they are present. See, Graham v. John Deere, 383 U.S. 1 (1966).

In view of all of the foregoing, it is respectfully submitted that claim 1 is patentable over the combination of Fefferman, Fitch, Leinkram et al. and Kuerschner et al. Withdrawal of this rejection is therefore respectfully requested.

III. Rejections of Claims 1 to 5 and 9 to 10 Under 35 U.S.C. § 103(a)

Claims 1, 9 and 10 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 5,052,382 ("Wainright"), Fefferman, Fitch, Leinkram and Kuerschner et al. Claims 2 to 5 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Fefferman, Fitch, Leinkram et al., Kuerschner et al. and U.S. Patent No. 5,759,230 ("Chow et al.") and as unpatentable over the combination of Wainright, Fefferman, Fitch, Leinkram et al., Kuerschner et al. and Chow et al. Applicants respectfully submit that claims 1 to 5 and 9 to 10 are patentable for the following reasons.

Claims 2 to 5 and 9 to 10 ultimately depend from claim 1 and therefore include all of the limitations of claim 1. As more fully set forth above, the Second Affidavit of Kuang-Lang Huang, including the photographic evidence, establishes the criticality of the baking temperature and the unexpected results achieved at temperatures in this range thereby providing evidence of non-obviousness of claim 1. Chow et al. purportedly relate to nanostructured metallic powders and films via an alcoholic solvent process. Wainright purportedly relates to an apparatus for the controlled generation and administration of ozone. Neither Chow et al. nor Wainright, however, is relied upon to cure the critical deficiencies of Fefferman, Fitch, Leinkram and Kuerschner et al. Indeed, they do not render the claimed range obvious. Accordingly, it is respectfully submitted that the combination of Wainright, Fefferman, Fitch, Leinkram et al., Kuerschner et al. and Chow et al. does not render obvious claims 2 to 5, which ultimately depend from claim 1, and it is respectfully submitted that the combination of Fefferman, Fitch, Leinkram et al. Kuerschner et al. and Wainright does not render obvious claims 1, 9 and 10, which also depend from claim 1. In re Fine, 837 F.2d 1071 (Fed. Cir. 1988) (any dependent claim that depends from a non-obvious independent claim is non-obvious).

V. Conclusion

It is therefore respectfully submitted that all of the presently pending claims are allowable. A favorable action on the merits is earnestly solicited.

Respectfully submitted,

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